Chapter 13. Mountain Counties Area of California

Setting

The Mountain Counties Area of California includes the foothills and mountains of the western slope of the Sierra Nevada and a portion of the Cascade Range. The area extends from the southern tip of Lassen County to the northern part of Fresno County (see Figure 13-1) and covers the eastern portions of the Sacramento River and San Joaquin River hydrologic regions. The foothill and mountain areas of these two hydrologic regions are grouped together for the purpose of presenting their common characteristics.

The area generally includes all or portions of Shasta, Lassen, Plumas, Butte, Sierra, Yuba, Nevada, Placer, El Dorado, Amador, Alpine, Calaveras, Tuolumne, Mariposa, Madera, and Fresno counties. Elevations vary from around 100 feet near the edge of the valley floor to more than 10,000 feet at locations along the Sierra Nevada and Cascade Range crest line. The major rivers in the area include the Feather, Yuba, Bear, Rubicon, and American rivers in the Sacramento River region; and the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, Fresno, and San Joaquin rivers in the San Joaquin River region.

Climate

The climate is closely tied to the topography and varies widely throughout the area; mean annual precipitation ranges from more than 80 inches at Strawberry Valley, east of Lake Oroville, to less than 12 inches at Fresno County. Much of the precipitation falls as snow in the higher elevations in the winter. Water managers throughout the area rely on this natural storage as snow in the winter months and capture or divert spring snowmelt runoff.

Population

The 2000 population of the area was about 541,710, less than 2 percent of the state total population. However, the effects of urbanization are beginning to affect some of the foothill areas. Population growth in the area from 1990 to 1995 was almost 10 percent. The state's growth rate during the same 5-year period was about 7 percent. Although total population in the area is low, the area's rate of growth is projected to continue to out pace that of the state as a whole. The projected population increase between 2000 and 2030 is about 55 percent for this foothill and mountain area, while the state's growth is projected at about 41 percent.

Per capita water use varies significantly throughout the area, from about 115 gallons per capita per day (gpcd) in the Volcano area of Amador County to about 420 gpcd in the southwestern corner of Lassen County.

Land Use

The economies of these mountain and foothill areas have historically been tied to the land. Tourism, ranching, timber harvesting, limited mining, and agriculture, primarily in the lower elevations, continue as an economic base for many communities. A limiting factor for the area's population growth is the relatively small amount of land in private ownership. The federal government is the dominant landowner in the area, with most of the higher elevation lands being under the management of the U.S. Forest Service or National Park Service.

Much of the state's developed water supply originates in this upland area, including several CVP and SWP reservoirs. Although the region has abundant surface water supplies, most of it is unavailable locally because of prior water rights appropriations for downstream or out-of-basin users. Local use of water originating within this region is less than 3 percent of the total statewide consumption.

Water Supply and Use

Locally developed surface water supplies account for almost 70 percent of the public consumptive water supply for this region. Water is either diverted directly from the area's streams and lakes or from local storage reservoirs and conveyance facilities. Many of the residents in the unincorporated areas are dependent on small, independent municipal water systems, and a few areas still use untreated water diverted directly from raw-water ditch delivery systems. In addition, many individual water users throughout the area have developed their own supplies, typically groundwater for domestic use and small surface storage or in limited cases, groundwater for agricultural use. Figure 13-3 provides a graphical presentation of all of the water supply sources that are used to meet the developed water uses within this hydrologic subarea for 1998, 2000, and 2001.

Regulation of Ditch Water – Water users in the foothills who obtain their water from ditches are no longer able to use that water for domestic purposes. New rules promulgated by the California Department of Health Services and the U.S. Environmental Protection Agency prohibit residential customers from cooking, drinking or brushing teeth with ditch water, including water processed by home treatment systems. In order to meet these requirements, several water districts are requiring customers to receive 5 gallons of bottled drinking water per month. This quantity meets the state's minimum estimate of what a normal household would use in a month.

Mining operations, especially hydraulic mining, from the Gold Rush Era marked the beginning of much of the water supply development to the foothill and mountain areas. Many of those early mining water systems were later taken over by other water users. Pacific Gas & Electric Company and other hydropower utilities subsequently developed an extensive hydroelectric power and consumptive water use delivery system throughout the Sierra Nevada, often incorporating some of the old mining ditches. Most of the early water conveyance facilities were later transferred to local water agencies for consumptive water deliveries. Some of these water agencies still use the ditch systems as a primary means of water delivery to both their water treatment plants and to the individual water users along the route to the treatment plants. Many of these old and unimproved conveyance systems, including ditches, flumes, and pipes have been in use for more than 100 years.

While logging and mining operations have decreased, recreation and tourism have increased in the Mountain Counties region which produces different effects on water use and quality. Second homes and vacation rentals are a growing trend in many of the foothill and mountain areas. This type of residential usage means that, although there is no permanent population associated with these homes, water use can be high on most weekends during the popular summer and winter vacation periods. For example, Groveland Community Services District, near Yosemite National Park in southern Tuolumne County, estimates that the service area population more than doubles during peak vacation periods. Tourism water use, which is most significant in the central Sierra, tends to inflate the area's per capita water use because the volume of water consumed is greater than the permanent residential population would indicate.

Most of the area's irrigated acres are found in the foothills and mountains of the Sacramento River Region. The dominant crop is pasture, which constitutes about 70 percent of the total irrigated acreage. Other crops with significant acreage include alfalfa, grain, wine grapes, apples and other deciduous fruit, and olives. Projections indicate almost no change in irrigated acreage through 2020, with a slight change in crop mix. Significant amounts of unirrigated lands are also used as rangeland for livestock.

Environmental water use in the region consists of instream flow requirements and Wild and Scenic River designations. Instream flow requirements within the area are found on the Stanislaus River, below Goodwin Dam, and the Tuolumne River, below La Grange Dam. The controlling instream minimum flow requirements for the remainder of the area's major rivers are located on the valley floor, which is downstream and outside of the Mountain Counties region. In addition, there are many smaller reservoirs in the area that do have instream flow requirements, which are met by the project operators. However, only the largest instream flow requirements for the major rivers have been counted as the instream demands for this water use tabulation. Documented Wild and Scenic River designations in this region include portions of the Feather River (north fork), Yuba River, American River, Tuolumne River and Merced River. Figure 13-2 presents a bar chart that summarizes all of the dedicated and developed urban, agricultural, and environmental water uses within the Mountain Counties region for 1998, 2000, and 2001.

Groundwater constitutes about 16 percent of region's water supply and is generally used as a supply for single family homes. Groundwater availability is often limited to fractured rock and small alluvial deposits immediately adjacent to the area's many streams. In the rural areas, many individual residences are wholly dependent upon groundwater for domestic use. In addition, many homes are not connected to a municipal water system and are typically dependent upon individual wells, which are often unreliable during drought periods. A limited number of farmers have developed wells with enough production to irrigate their lands in all but the driest of years. In general, groundwater is an inadequate and unreliable supply for large scale usage in this region, due to the limitations of the fractured granite formations that constitute much of the Sierra Nevada foothills and the western slopes of the mountains.

In addition to locally supplied surface water, some water is provided by storage facilities of the federal Central Valley Project, other federal water facilities, locally developed imports, and reclaimed wastewater. In the American River basin, the Foresthill Public Utility District has a water supply contract for CVP water. Calaveras County Water District and Union Public Utility District receive water from New Hogan Reservoir, which is operated by the U.S. Army Corps of Engineers. Irrigated pasture in Sierra County receives a small amount of water imported from the Little Truckee River in the North Lahontan Hydrologic Region. In addition, PG&E imports water from Echo Lake near Lake Tahoe in the North Lahontan Hydrologic Region as part of a hydropower diversion into the American River basin. Reclaimed wastewater is used to a limited extent to irrigate golf courses and meet other landscaping and agricultural needs throughout the region.

The water use and water supply graphs in Figures 13-2 and 13-3 summarize the detailed regional water accounting contained in the water portfolio tables at the end of this regional description. As shown on the map in Figure 13-1, most of the area's surface water either flows or is diverted to other regions outside of the Mountain Counties area.

State of the Region

Challenges

By virtue of their location in the upstream watersheds, domestic water users in the Mountain Counties generally benefit from higher quality surface water than most other areas of the State. Many water supplies originate from pristine foothill or mountain sources, which are largely unaffected by agricultural or urban pollution. Unfortunately, this higher quality surface water is often degraded as it flows downstream or is diverted through the numerous canals and delivery systems. Water drainage from abandoned mines, including Penn Mine in the Mokelumne River watershed, contributes metals and other water quality problems downstream. Mercury was imported into this region as part of the gold mining activities of past eras, and it remains in some water supplies as a water quality issue. Erosion from natural flooding, logging and land development, and areas devastated from forest fires, introduces sedimentation and nutrients to waterways, as well as causing elevated stream temperatures due to the loss of riparian shade canopy. This is a concern to both domestic water treatment operations and to spawning and migration of salmonids, particularly below the major dams on the Stanislaus, Tuolumne, and Merced rivers. The conversion of agricultural land to residential use, and undeveloped land to both agricultural and residential use, could present new and different water quality problems in the future.

The biggest water issue facing users in the area is the need to improve the water supply reliability of the various water delivery systems throughout the area. The population of some areas is increasing rapidly because people are migrating to the foothills from the metropolitan areas. Despite rapid population growth, the customer base for many of the water districts is still relatively small and widely dispersed. This smaller base, coupled with previous development of the less costly reservoir sites, as well as the mountainous topography, makes water system improvements expensive and makes interconnections between systems impractical. Also, a limited array of options are available to meet current and projected needs, due to the local water users' limited ability to pay the costs of improvements and the lack of groundwater aquifers to facilitate groundwater banking and conjunctive use strategies. Some local officials directly responsible for water delivery within the Mountain Counties Area are evaluating the potential use of California's "Area of Origin and Watershed Protection" water laws as a method for meeting projected growth within their respective areas as well as improving water supply reliability to existing users. These legal statutes provide for the reservation of water supplies for counties in which the water originates when a state water right filing is assigned for use elsewhere, as well as setting aside water for future development in the area. Typically, however, the upland areas have not had the population and financial base to contract with SWP or CVP for a water supply, nor has the SWP or CVP had adequate supplies of unallocated water to meet the needs of most Mountain Counties communities.

Historically many small water systems in the foothills and mountains of California have relied on surface water or local springs with minimal or no water treatment. Some small rural water systems have also relied upon water from open ditch systems, sometimes in use for over 100 years, that were intended primarily for agriculture or hydropower purposes and used only incidentally for domestic water. However, with a greater recognition of the health risk posed by pathogens in drinking water sources, these systems must now maintain reliable filtration and

After the 1997 floods, a landslide destroyed a 30-foot section of Georgetown's canal, which supplies water to 9,000 customers in six towns in rural El Dorado County. Nearby, El Dorado Irrigation District also lost use of it flume from the forebay on the American River due to a separate landslide.

disinfection facilities and in most cases required improvements are being made. In addition, low housing densities in this region result in a large number of isolated, small water systems, which individually do not have the technical or financial capacity to upgrade their treatment facilities and infrastructure, and cannot consolidate to take financial advantage of a larger water utility customer base. When such treatment upgrades are infeasible, water purveyors are instead requiring customers to use bottled water for drinking purposes.

Another common problem for the older open ditch delivery systems within the Mountain Counties region is the tendency to have large conveyance and seepage losses, as well as sanitary hazards associated with open water systems. Repairs and replacement of some open ditch systems have sometimes been opposed by various groups and landowners who argue the loss of the aesthetics of the flowing canal, and loss of vegetation and wildlife created by leakage and percolation. Many other water users in this region are on private wells, which are unregulated statewide and, thus, have never been assessed for potential water quality contamination.

Most areas within the Mountain Counties region are very concerned with forest fires and the damage they cause to the watersheds and the wooden infrastructure associated with the ditch systems. Every year, numerous forest fires occur in the Sierra Nevada which expose the watersheds to soil erosion. Sediment loads from erosion can obstruct water flow in open ditches, reduce reservoir capacity, add nutrient loading, diminish water quality and cause excessive algae growth. Fires have damaged components of the ditch systems including diversion structures and flume sections. As a result some small communities have been left without water for extended periods of time.

Water supply managers in the area are concerned about federal and State designations of Wild and Scenic streams. When a river or stream is designated as Wild and Scenic, the accompanying regulations can sometimes preclude water resources development. Environmental interests are concerned about preserving the few undeveloped streams or sections of streams remaining in the area. Federal statutes prohibit federal agencies from constructing, authorizing, or funding water resources projects that would have a direct and adverse effect on the values for which the river was designated. The state wild and scenic law prohibits construction of any dam, reservoir, diversion, or other water impoundment in specific regions. However in some situations where a diversion is needed to supply domestic

In 1996, the University of California released its "Sierra Nevada Ecosystem Study," as a part of a project by the same name. The report is the result of a three year congressionally mandated study of the entire Sierra Nevada, with a primary emphasis on gathering and analyzing data to assist Congress and other decision makers in future management of the mountain range. The project goal is to maintain the health and sustainability of the ecosystem while providing resources to meet human needs. The study states that, "excluding the hard-to-quantify public good value of flood control and reservoir-based recreation, the hydroelectric generating, irrigation and urban use values of water are far greater than the combined value of all other commodities produced in the Sierra Nevada." The report estimates the value of water at 60 percent of all commodities produced in the foothills and mountains of the Sierra Nevada. This commodity-based view of water leads to some of the study's related conclusions that, "increased concern about the ecological impacts of diversions as well as the social decisions about who should bear the financial burdens of plans to reduce, or at least stop the growth of, these impacts requires a greater understanding of how diversions, economic benefits, and ecological impacts are linked."

water to residents of an area through which the wild and scenic river flows, such diversions may sometimes be authorized.

Like surface water, groundwater in this region is generally of good quality, but it may be contaminated by naturally occurring radon, uranium, or sulfide mineral deposits containing heavy metals. In particular, radon contamination is associated with granite, such as the granite batholith of the Sierra Nevada. Meeting State secondary standards for both iron and magnesium can also be difficult for some groundwater sources. Also, because of the lack of community wastewater systems, individual septic tanks are prevalent for rural residential development in this region. The failure of septic tank systems can create sewage flows that have the potential to adversely affecting nearby wells and groundwater quality.

Accomplishments

In 1997, Sacramento area interests released the Draft Recommendations for the Water Forum Agreement. This group is pursuing two objectives: (1) provide a reliable water supply for the region through 2030 and (2) reserve the fishery, wildlife recreation, and aesthetic values of the Lower American River. The proposed draft solution includes an integrated package of seven actions. Generally, foothill water interests would increase their diversions from the American River in average and wet years and decrease those diversions in drier and driest years. Placer County Water Agency would be providing excess water from non-American River sources to many of the participating water agencies during drier water years to help make up the decreased American River diversions in those years. PCWA's participation in many of these specific agreements is dependent upon State Water Resources Control Board approval for changes to conditions of its existing water rights.

Relationship to Other Regions

Much of the state's developed water supply originates from the Sierra Nevada mountains in the upland portions of this region. Many surface storage and diversion facilities capture and export water, including several CVP and SWP reservoirs, and local facilities operated by Yuba County Water Agency, East Bay Municipal Utility District, the City of San Francisco, Modesto and Turlock Irrigation Districts, and Merced Irrigation District. The map in Figure 13-1 provides information about the volume of water exports from the Mountain Counties region for years 1998, 2000 and 2001.

Looking to the Future

Urban and agricultural water users in most of the Mountain Counties region have limited water supply options to meet future needs, because of the mountainous topography, lack of significant groundwater aquifers, limited financial resources for water development, and the fact that most water originating in the area was previously allocated to downstream users and exports through the water rights process. However, most water agencies are actively pursuing a wide variety of supply augmentation and demand reduction actions to secure water for future needs. For example, El Dorado Irrigation District is seeking funding to conduct feasibility studies for development of a 31,000 acre-feet Alder Reservoir, which would provide drought storage, enhanced environmental flows, and hydropower generation benefits. In addition to its ongoing water conservation and water recycling programs, the District is planning on lining a 2.5-mile ditch system to save an estimated 1,300 acre-feet that is currently lost through seepage.

At the southern end of the Mountain Counties region in the Upper San Joaquin River basin, the California Bay-Delta Authority is conducting feasibility studies for development of additional surface storage in the

upper watershed. Several alternative sites will be evaluated including one called Temperance Flat. If it is determined to be feasible, such storage could help to contribute to restoration and improvement of water flows and quality in the lower San Joaquin River, and would facilitate conjunctive water management and water exchanges among downstream water agencies.

Throughout California there are over 100 existing hydroelectric projects that hold Federal Energy Regulatory Commission (FERC) licenses which will be up for federal license renewal within the next ten years. A large number of these projects are located on river systems within the Mountain Counties region. As part of the FERC license renewal process, the project owners must conduct studies to evaluate the future use, impacts and alternatives for each hydroelectric project. For local water agencies this process will provide key opportunities to develop and improve integrated resource planning, so that the proposed reoperation and federal re-licensing of hydroelectric projects can also consider improved benefits to local water supplies, instream flows, and recreation uses.

Regional Planning

The Mountain Counties Water Resources Association assists water agencies and local governments in coordinating water resource matters important to the region. The Association also interfaces with applicable state officials and departments on water resource matters. Some agencies are looking for new supplies from expansion of existing storage, re-operation of existing hydroelectric storage, or construction of new storage. For example, Lyons Reservoir, in the Tuolumne Utilities District is a 5,800 acre-foot joint use facility, supplying both hydroelectric power and consumptive water storage. TUD is considering the expansion of Lyons Reservoir to 50,000 acre feet. While large quantities of groundwater are not generally available in the Sierra-Cascade Mountain Area, a number of local agencies are implementing groundwater management strategies to help ensure the reliability of local groundwater supplies.

Several local agencies and governments are developing recycled water projects. A few examples are:

- El Dorado Irrigation District is investigating construction of up to 5,000 acre feet of seasonal storage to more efficiently use recycled water in the district. The storage would allow for meeting recycled water demands, without supplemental water or shortages through 2025.
- The city of Auburn is developing a proposal to sell up to 5,000 acre feet of recycled water to agricultural users by 2020. The water is expected to be delivered near Lincoln, on the valley floor. This option is included in the Sacramento River Region management plan.
- The city of Angels Camp in Calaveras County is developing plans to expand its reclaimed water deliveries by 300 acre feet to agricultural, environmental, and landscape users by 2020.

South Sutter Water District's Conveyance Canal Improvement Plan

- Increase the flexibility, timing, and reliability of surface water supplies.
- Replenish groundwater supplies for extraction in drier years.
- Recharge the groundwater basin to reduce the effect of declining groundwater levels.
- Provide the ability to meet additional water needs (including Bay Delta Authority environmental objectives) outside of SSWD.
- Replace older conveyance structures with advanced control technology.
- Enhance SSWD's conjunctive water management activities.
- Reduce the need for cropping changes during drier water years.
- Increase power generation and decrease power use for pumping.
- Increase water use efficiency by installing state-of-the-art water control and measurement structures.

- Two other projects in Calaveras County will deliver 470 acre feet for landscape irrigation.
- Groveland Community Services District, in southern Tuolumne County anticipates 425 acre feet being made available to agricultural customers by 2020.
- The Sierra Conservation Center in Tuolumne County is planning a project to deliver almost 300 acre feet for agriculture and landscape irrigation by 2020.

Urban growth, with an average of 1,800 new homes each year in the city of Lincoln, has created a need for new drinking water in an area that has been served agricultural water since 1926. An association consisting of the Nevada Irrigation District, Placer County Water Agency, and the city of Lincoln, is investigating how to accommodate this change in water use in order to eliminate the need to find additional water supplies or to continue groundwater pumping to meet the domestic water needs.

In February 2000, South Sutter Water District, Camp Far West Irrigation District, and the California Department of Water Resources entered an agreement to meet the State Water Resource Control Board's water quality objectives -- Phase 8 of the Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary. In exchange for up to 4,400 acre feet of water from Camp Far West Reservoir in each dry and critical year, DWR agreed to assume all responsibility for all Bear River water rights holders' obligations under Phase 8. In addition, South Sutter Water District is implementing its Conveyance Canal Improvement Plan to increase the system conveyance capacity. The additional water for conveyance will be obtained from increases in diversion of stored water and water that is spilled from Camp Far West Reservoir.

Water Portfolios for Water Years 1998, 2000, and 2001

The following tables and graphs present actual information about the water supplies and uses for the Mountain Counties hydrologic region. Water year 1998 was a wet year for this region, with annual precipitation at 154 percent of normal, while the statewide annual precipitation was 171 percent of average. Year 2000 represents nearly normal hydrologic conditions with annual precipitation at 107 percent of average for the Mountain Counties region, and 2001 reflected dryer water year conditions with annual precipitation at 65 percent of average. For comparison, statewide average precipitation in year 2001 was 72 percent of normal. Table 13-1 provides more detailed information about the total water supplies available to this region for these three specific years from precipitation, imports and groundwater, and also summarizes the uses of all of the water supplies. The three Water Portfolio tables included in Table 13-2 and companion Water Portfolio flow diagrams (Figures 13-4, 13-5 and 13-6) provided more detailed information about how the available water supplies are distributed and used throughout this region.

A more detailed tabulation of the portion of the total available water that is dedicated to urban, agricultural and environmental purposes is presented in Table 13-3. Table 13-3 also provides detailed information about the sources of the developed water supplies, which are primarily from surface water systems and include a large percentage of water imports from other regions. These developed water use and supplies for the three years are also presented graphically in Figures 13-2 and 13-3.

Sources of Information

- Water Quality Control Plan, Regional Water Quality Control Board
- Watershed Management Initiative Chapter, Regional Water Quality Control Board
- 2002 California 305(b) Report on Water Quality, State Water Resources Control Board
- Bulletin 118 (Draft), California's Groundwater, Update 2003, Department of Water Resources
- Nonpoint Source Program Strategy and Implementation Plan, 1998-2013, State Water Resources Control Board, California Coastal Commission, January 2000
- Strategic Plan, State Water Resources Control Board, Regional Water Quality Control Boards, November 15, 2001
- Water Needs Assessment, Mountain Counties Water Resources Association, March 1999.

Figure 13-1
Mountain Counties of California

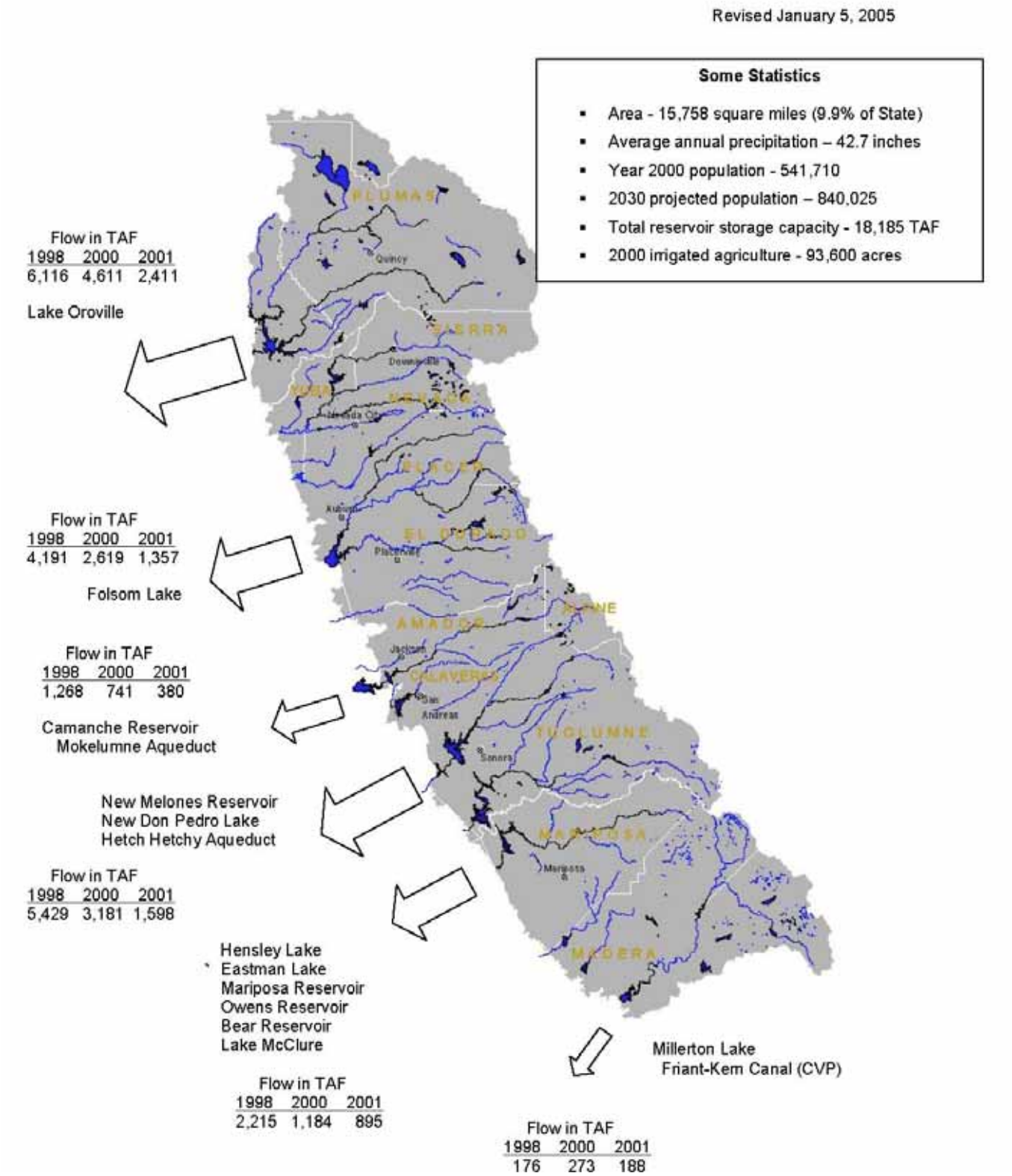

Figure 13-2
Mountain Counties Applied Water Uses For Water Years 1998, 2000, 2001

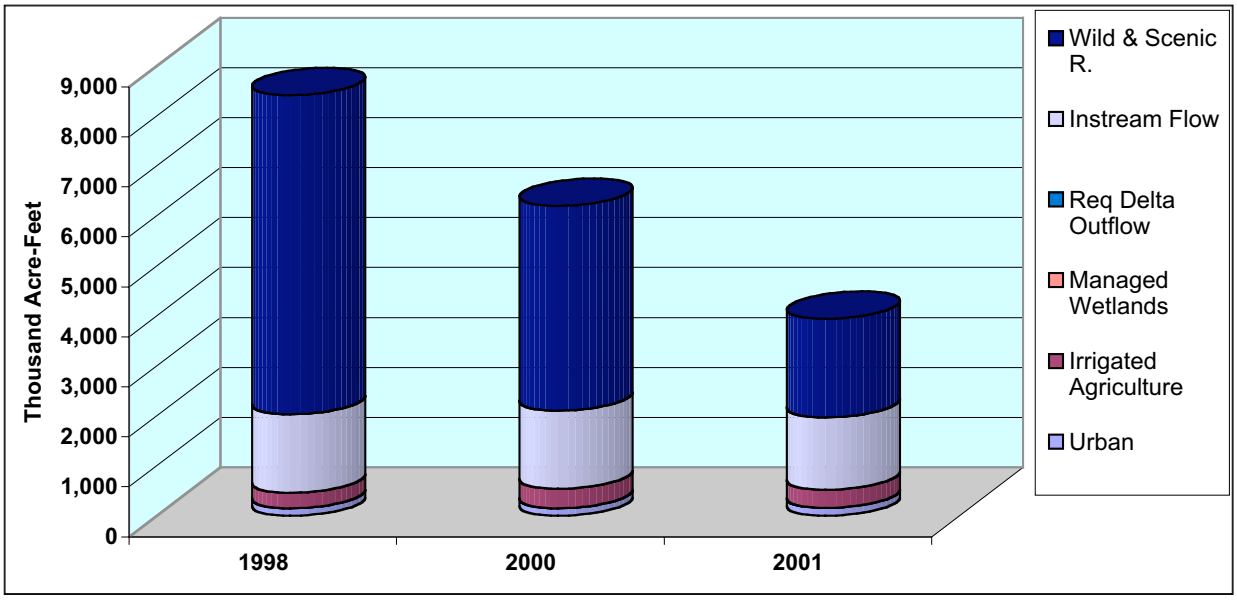

Figure 13-3
Mountain Counties Dedicated Water Supplies For Water Years 1998, 2000, 2001

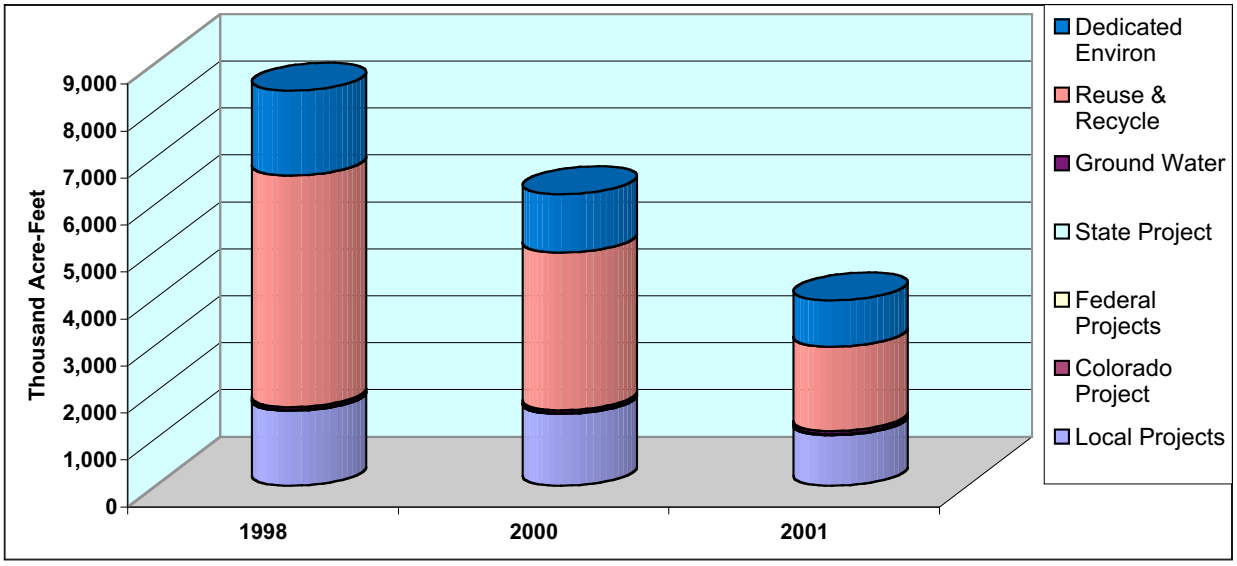

Table 13-1
Mountain Counties of California Water Balance Summary – TAF

Water Entering the Region – Water Leaving the Region = Storage Changes in Region

	Water Year (Percent of Normal Precipitation)		
	1998 (154%)	2000 (107%)	2001 (65%)
Water Entering the Region			
Precipitation	55,206	38,412	23,445
Inflow from Oregon/Mexico	0	0	0
Inflow from Colorado River	0	0	0
Imports from Other Regions	0	0	0
Total	**55,206**	**38,412**	**23,445**
Water Leaving the Region			
Consumptive Use of Applied Water * (Ag, M&I, Wetlands)	235	277	262
Outflow to Oregon/Nevada/Mexico	0	0	0
Exports to Other Regions	4,004	3,772	2,607
Statutory Required Outflow to Salt Sink	3,034	2,331	1,636
Additional Outflow to Salt Sink	81	174	180
Evaporation, Evapotranspiration of Native Vegetation, Groundwater Subsurface Outflows, Natural and Incidental Runoff, Ag Effective Precipitation & Other Outflows	45,435	32,678	21,558
Total	**52,789**	**39,232**	**26,243**
Storage Changes in the Region [+] Water added to storage [–] Water removed from storage			
Change in Surface Reservoir Storage	2,420	-802	-2,721
Change in Groundwater Storage **	-3	-18	-77
Total	**2,417**	**-820**	**-2,798**

Applied Water * (compare with Consumptive Use)	396	466	446

* Definition - Consumptive use is the amount of applied water used and no longer available as a source of supply. Applied water is greater than consumptive use because it includes consumptive use, reuse, and outflows.

**Footnote for change in Groundwater Storage

Change in Groundwater Storage is based upon best available information. Basins in the north part of the State (North Coast, San Francisco, Sacramento River and North Lahontan Regions and parts of Central Coast and San Joaquin River Regions) have been modeled – Spring 1997 to Spring 1998 for the 1998 water year and Spring 1999 to Spring 2000 for the 2000 water year. All other regions and Year 2001 were calculated using the following equation:

GW change in storage =
intentional recharge + deep percolation of applied water + conveyance deep percolation – withdrawals

This equation does not include the unknown factors such as natural recharge and subsurface inflow and outflow

Table 13-2
Water Portfolios for Water Years 1998, 2000 and 2001

Category	Description	Mountain Counties 1998 (TAF)				Mountain Counties 2000 (TAF)				Mountain Counties 2001 (TAF)				Data
Inputs:		Water Portfolio	Applied Water	Net Water	Depletion	Water Portfolio	Applied Water	Net Water	Depletion	Water Portfolio	Applied Water	Net Water	Depletion	Detail
1	Colorado River Deliveries		-				-				-			PSA/DAU
2	Total Desalination		-				-				-			PSA/DAU
3	Water from Refineries		-				-				-			PSA/DAU
4a	Inflow From Oregon		-				-				-			PSA/DAU
b	Inflow From Mexico		-				-				-			PSA/DAU
5	Precipitation	55,205.7				38,412.2				23,444.5				REGION
6a	Runoff - Natural	N/A				N/A				N/A				REGION
b	Runoff - Incidental	N/A				N/A				N/A				REGION
7	Total Groundwater Natural Recharge	N/A				N/A				N/A				REGION
8	Groundwater Subsurface Inflow	N/A				N/A				N/A				REGION
9	Local Deliveries		1,582.1				1,514.9				1,064.4			PSA/DAU
10	Local Imports		9.7				10.4				8.5			PSA/DAU
11a	Central Valley Project :: Base Deliveries		-				-				-			PSA/DAU
b	Central Valley Project :: Project Deliveries		25.7				26.3				18.4			PSA/DAU
12	Other Federal Deliveries		1.6				1.1				1.6			PSA/DAU
13	State Water Project Deliveries		-				-				-			PSA/DAU
14a	Water Transfers - Regional		-				-				-			PSA/DAU
b	Water Transfers - Imported		-				-				-			PSA/DAU
15a	Releases for Delta Outflow - CVP		-				-				-			REGION
b	Releases for Delta Outflow - SWP		-				-				-			REGION
c	Instream Flow Applied Water		1,569.5				1,563.0				1,450.6			REGION
16	Environmental Water Account Releases		-								-			PSA/DAU
17a	Conveyance Return Flows to Developed Supply - Urban		-								-			PSA/DAU
b	Conveyance Return Flows to Developed Supply - Ag		22.6				-				-			PSA/DAU
c	Conveyance Return Flows to Developed Supply - Managed Wetland		-				-				-			PSA/DAU
18a	Conveyance Seepage - Urban		-								-			PSA/DAU
b	Conveyance Seepage - Ag		3.6				4.7				3.7			PSA/DAU
c	Conveyance Seepage - Managed Wetlands		-				-				-			PSA/DAU
19a	Recycled Water - Agriculture		1.2				1.2				1.2			PSA/DAU
b	Recycled Water - Urban		-				-				-			PSA/DAU
c	Recycled Water - Groundwater		-				-				-			PSA/DAU
20a	Return Flow to Developed Supply - Ag		55.0				-				-			PSA/DAU
b	Return Flow to Developed Supply - Wetlands		-				-				-			PSA/DAU
c	Return Flow to Developed Supply - Urban		-				-				-			PSA/DAU
21a	Deep Percolation of Applied Water - Ag		6.0				6.1				4.5			PSA/DAU
b	Deep Percolation of Applied Water - Wetlands		-				-				-			PSA/DAU
c	Deep Percolation of Applied Water - Urban		18.9				17.5				18.1			PSA/DAU
22a	Reuse of Return Flows within Region - Ag		7.7				12.0				6.9			PSA/DAU
b	Reuse of Return Flows within Region - Wetlands, Instream, W&S		4,917.6				3,330.3				1,783.0			PSA/DAU
24a	Return Flow for Delta Outflow - Ag		-				-				-			PSA/DAU
b	Return Flow for Delta Outflow - Wetlands, Instream, W&S		3,033.5				2,331.4				1,636.4			PSA/DAU
c	Return Flow for Delta Outflow - Urban Wastewater		-				-				-			PSA/DAU
25	Direct Diversions	N/A				N/A				N/A				PSA/DAU
26	Surface Water in Storage - Beg of Yr	11,595.4				12,504.6				11,702.6				PSA/DAU
27	Groundwater Extractions - Banked	-				-				-				PSA/DAU
28	Groundwater Extractions - Adjudicated	-				-				-				PSA/DAU
29	Groundwater Extractions - Unadjudicated	60.2				60.1				72.8				REGION
Withdrawals:	**In Thousand Acre-feet**													
23	Groundwater Subsurface Outflow	-				-				-				REGION
30	Surface Water Storage - End of Yr	14,015.1				11,702.6				8,982.1				PSA/DAU
31	Groundwater Recharge-Contract Banking		-				-				-			PSA/DAU
32	Groundwater Recharge-Adjudicated Basins		-				-				-			PSA/DAU
33	Groundwater Recharge-Unadjudicated Basins		-				-				-			REGION
34a	Evaporation and Evapotranspiration from Native Vegetation				N/A				N/A				N/A	REGION
b	Evaporation and Evapotranspiration from Unirrigated Ag				N/A				N/A				N/A	REGION
35a	Evaporation from Lakes				92.4				92.4				92.4	REGION
b	Evaporation from Reservoirs				630.2				630.2				630.2	REGION
36	Ag Effective Precipitation on Irrigated Lands		82.3				57.8				77.0			REGION
37	Agricultural Water Use		260.3	246.6	191.5		330.7	312.6	312.5		306.5	295.1	295.1	PSA/DAU
38	Managed Wetlands Water Use		-	-	-		-	-	-		-	-	-	PSA/DAU
39a	Urban Residential Use - Single Family - Interior		28.0				27.6				28.5			PSA/DAU
b	Urban Residential Use - Single Family - Exterior		57.6				57.0				59.6			PSA/DAU
c	Urban Residential Use - Multi-family - Interior		10.1				10.2				10.5			PSA/DAU
d	Urban Residential Use - Multi-family - Exterior		3.6				4.0				4.0			PSA/DAU
40	Urban Commercial Use		11.4				11.7				11.8			PSA/DAU
41	Urban Industrial Use		14.0				14.0				14.2			PSA/DAU
42	Urban Large Landscape		11.0				10.8				11.3			PSA/DAU
43	Urban Energy Production		-				-				-			PSA/DAU
44	Instream Flow		1,569.5	1,269.9	1,269.9		1,563.0	1,305.8	1,305.8		1,450.6	1,323.1	1,323.1	PSA/DAU
45	Required Delta Outflow		-	-	-		-	-	-		-	-	-	PSA/DAU
46	Wild and Scenic Rivers		6,381.6	1,763.6	1,763.6		4,098.7	1,025.6	1,025.6		1,968.8	313.3	313.3	PSA/DAU
47a	Evapotranspiration of Applied Water - Ag				177.1				223.9				206.5	PSA/DAU
b	Evapotranspiration of Applied Water - Managed Wetlands				-				-				-	PSA/DAU
c	Evapotranspiration of Applied Water - Urban				57.7				53.3				55.0	PSA/DAU
48	Evaporation and Evapotranspiration from Urban Wastewater				-				-				-	REGION
49	Return Flows Evaporation and Evapotranspiration - Ag				6.0				7.8				6.0	PSA/DAU
50	Urban Waste Water Produced	45.6				53.2				54.9				REGION
51a	Conveyance Evaporation and Evapotranspiration - Urban				9.8				8.0				9.6	PSA/DAU
b	Conveyance Evaporation and Evapotranspiration - Ag				10.6				22.8				22.7	PSA/DAU
c	Conveyance Evaporation and Evapotranspiration - Managed Wetlands				-				-				-	PSA/DAU
d	Conveyance Loss to Mexico				-				-				-	PSA/DAU
52a	Return Flows to Salt Sink - Ag				12.1				102.1				104.1	PSA/DAU
b	Return Flows to Salt Sink - Urban				69.0				72.2				76.0	PSA/DAU
c	Return Flows to Salt Sink - Wetlands				0.0				0.0				0.0	PSA/DAU
53	Remaining Natural Runoff - Flows to Salt Sink				0.0				0.0				0.0	REGION
54a	Outflow to Nevada				-				-				-	REGION
b	Outflow to Oregon				-				-				-	REGION
c	Outflow to Mexico				-				-				-	REGION
55	Regional Imports	0.0				0.0				0.0				REGION
56	Regional Exports	4,004.0				3,771.9				2,607.3				REGION
59	Groundwater Net Change in Storage	-3.2				-17.9				-77.3				REGION
60	Surface Water Net Change in Storage	2,419.7				-802.0				-2,720.5				REGION
61	Surface Water Total Available Storage	18,185.0				18,185.0				18,185.0				REGION

Colored spaces are where data belongs. N/A - Data Not Available "-" - Data Not Applicable "0" - Null value

Table 13-3
Mountain Counties of California Water Use and Distribution of Dedicated Supplies - TAF

	1998			2000			2001		
	Applied Water Use	Net Water Use	Depletion	Applied Water Use	Net Water Use	Depletion	Applied Water Use	Net Water Use	Depletion
WATER USE									
Urban									
Large Landscape	11.0			10.8			11.3		
Commercial	11.4			11.7			11.8		
Industrial	14.0			14.0			14.2		
Energy Production	0.0			0.0			0.0		
Residential - Interior	38.1			37.8			39.0		
Residential - Exterior	61.2			61.0			63.6		
Evapotranspiration of Applied Water		57.7	57.7		53.3	53.3		55.0	55.0
Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Outflow		59.2	59.2		64.6	64.6		66.8	66.8
Conveyance Losses - Applied Water	19.6			15.6			18.8		
Conveyance Losses - Evaporation		9.8	9.8		8.0	8.0		9.6	9.6
Conveyance Losses - Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Outflow		9.8	9.8		7.6	7.6		9.2	9.2
GW Recharge Applied Water	0.0			0.0			0.0		
GW Recharge Evap + Evapotranspiration		0.0	0.0		0.0	0.0		0.0	0.0
Total Urban Use	**155.3**	**136.5**	**136.5**	**150.9**	**133.5**	**133.5**	**158.7**	**140.6**	**140.6**
Agriculture									
On-Farm Applied Water	260.3			330.7			306.5		
Evapotranspiration of Applied Water		177.1	177.1		223.9	223.9		206.5	206.5
Irrecoverable Losses		6.0	6.0		7.8	7.8		6.0	6.0
Outflow		63.4	8.4		80.8	80.8		82.6	82.6
Conveyance Losses - Applied Water	49.1			59.6			58.1		
Conveyance Losses - Evaporation		10.6	10.6		22.8	22.8		22.7	22.7
Conveyance Losses - Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Outflow		26.3	3.7		21.3	21.3		21.5	21.5
GW Recharge Applied Water	0.0			0.0			0.0		
GW Recharge Evap + Evapotranspiration		0.0	0.0		0.0	0.0		0.0	0.0
Total Agricultural Use	**309.4**	**283.4**	**205.8**	**390.3**	**356.6**	**356.6**	**364.6**	**339.3**	**339.3**
Environmental									
Instream									
Applied Water	1,569.5			1,563.0			1,450.6		
Outflow		1,269.9	1,269.9		1,305.8	1,305.8		1,323.1	1,323.1
Wild & Scenic									
Applied Water	6,381.6			4,098.7			1,968.8		
Outflow		1,763.6	1,763.6		1,025.6	1,025.6		313.3	313.3
Required Delta Outflow									
Applied Water	0.0			0.0			0.0		
Outflow		0.0	0.0		0.0	0.0		0.0	0.0
Managed Wetlands									
Habitat Applied Water	0.0			0.0			0.0		
Evapotranspiration of Applied Water		0.0	0.0		0.0	0.0		0.0	0.0
Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Outflow		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Applied Water	0.0			0.0			0.0		
Conveyance Losses - Evaporation		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Irrecoverable Losses		0.0	0.0		0.0	0.0		0.0	0.0
Conveyance Losses - Outflow		0.0	0.0		0.0	0.0		0.0	0.0
Total Managed Wetlands Use	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Environmental Use	**7,951.1**	**3,033.5**	**3,033.5**	**5,661.7**	**2,331.4**	**2,331.4**	**3,419.4**	**1,636.4**	**1,636.4**
TOTAL USE AND LOSSES	**8,415.8**	**3,453.4**	**3,375.8**	**6,202.9**	**2,821.5**	**2,821.5**	**3,942.7**	**2,116.3**	**2,116.3**
DEDICATED WATER SUPPLIES									
Surface Water									
Local Deliveries	1,582.1	1,582.1	1,506.3	1,514.9	1,514.9	1,514.9	1,064.4	1,064.4	1,064.4
Local Imported Deliveries	9.7	9.7	9.2	10.4	10.4	10.4	8.5	8.5	8.5
Colorado River Deliveries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CVP Base and Project Deliveries	25.7	25.7	24.5	26.3	26.3	26.3	18.4	18.4	18.4
Other Federal Deliveries	1.6	1.6	1.5	1.1	1.1	1.1	1.6	1.6	1.6
SWP Deliveries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Required Environmental Instream Flow	1,806.4	1,806.4	1,806.4	1,241.9	1,241.9	1,241.9	982.2	982.2	982.2
Groundwater									
Net Withdrawal	26.7	26.7	26.7	25.7	25.7	25.7	40.0	40.0	40.0
Artificial Recharge	0.0			0.0			0.0		
Deep Percolation	33.5			34.4			32.8		
Reuse/Recycle									
Reuse Surface Water	4,928.9			3,347.0			1,793.6		
Recycled Water	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
TOTAL SUPPLIES	**8,415.8**	**3,453.4**	**3,375.8**	**6,202.9**	**2,821.5**	**2,821.5**	**3,942.7**	**2,116.3**	**2,116.3**
Balance = Use - Supplies	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

Figure 13-4
Mountain Counties of California 1998 Flow Diagram
In Thousand Acre-Feet (TAF)

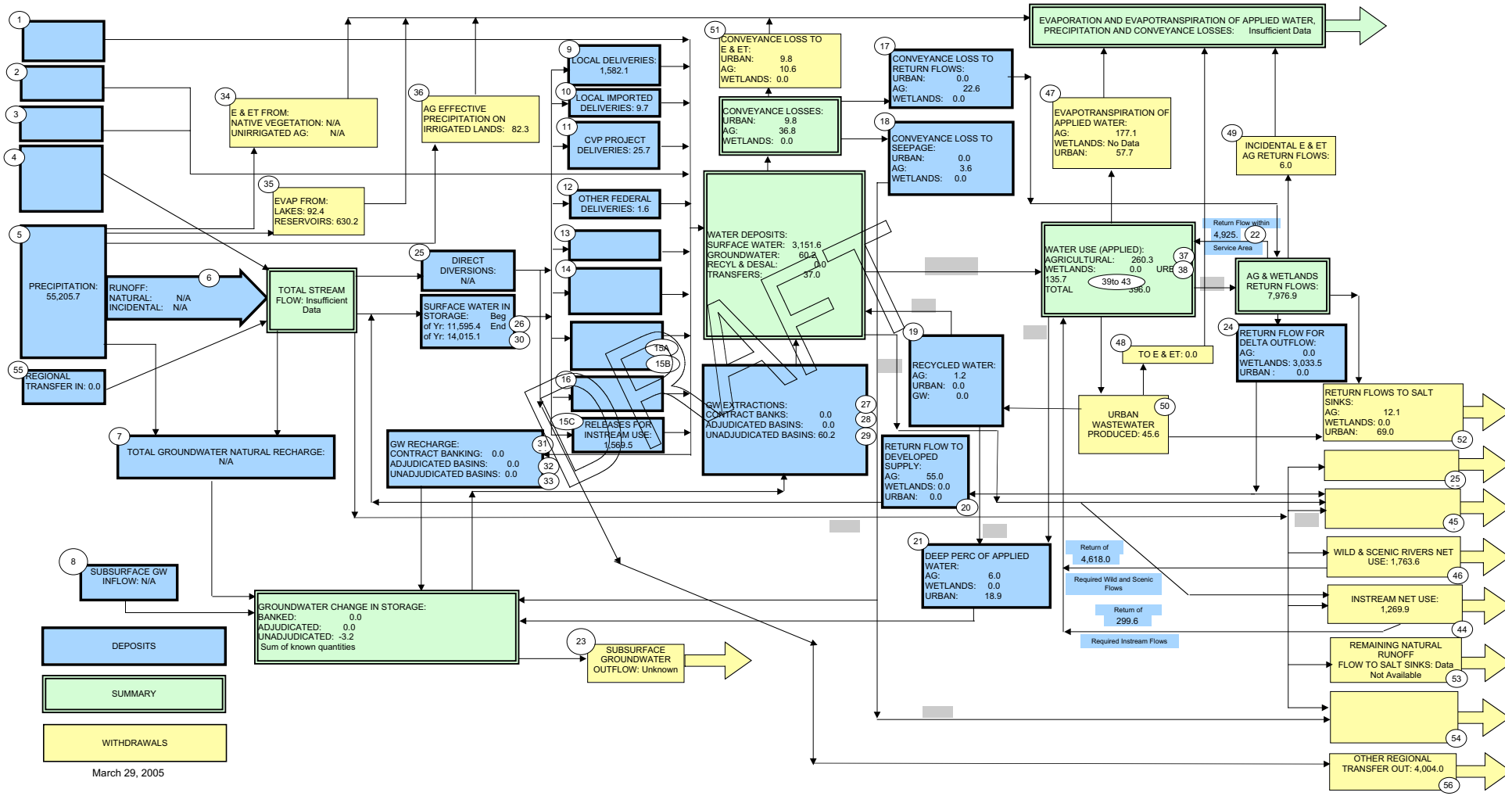

Figure 13-5
Mountain Counties of California 2000 Flow Diagram
In Thousand Acre-Feet (TAF)

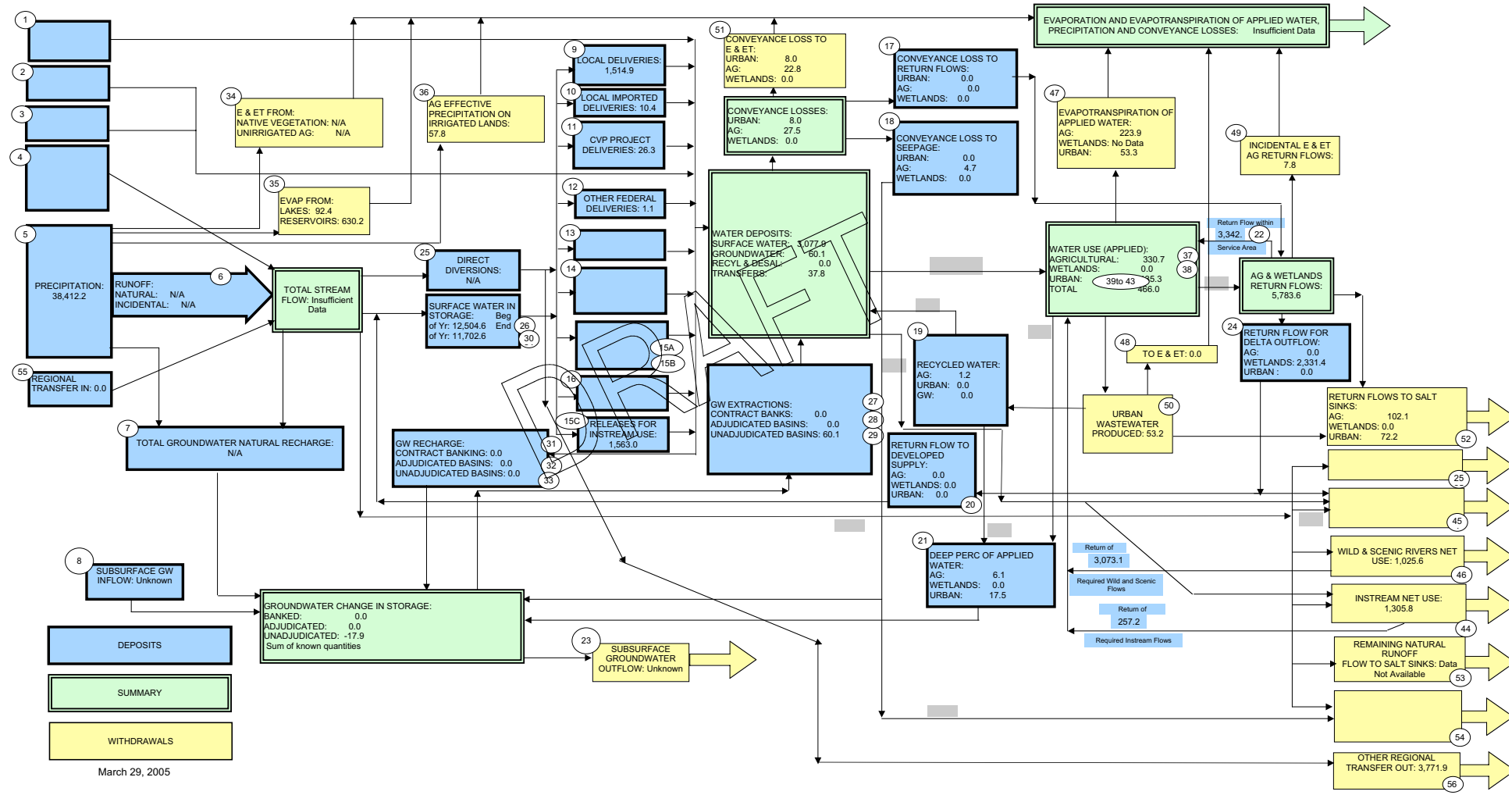

Figure 13-6
Mountain Counties of California 2001 Flow Diagram
In Thousand Acre-Feet (TAF)